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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,669	09/18/2003	David J. Alcoe	END920010135US2	8575
7590 10/17/2005			EXAMINER	
Schmieser, Olsen & Watts 3 Lear Jet Lane, Suit 201 Latham, NY 12110			LE, THAO X	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 10/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

**Office Action Summary**

Application No.

10/665,669

Applicant(s)

ALCOE ET AL.

Examiner

Thao X. Le

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 10-17, 21, 22 and 33-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-17, 21, 22 and 33-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 10-16, 22, 28, 33-36, 38-39 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5880524 to Xie.

Regarding claim 10, Xie discloses 10 discloses a method for dissipating heat from an electronic package having one or more components comprising: providing a substrate 402, column 4 line 46, having a first coefficient of thermal expansion (CTE); providing a lid 404, column 4 line 47, said lid having a top wall 424, a bottom wall 426, and sidewalls 445, column 5 lines 5-6 fig. 4, connecting said top and bottom walls said top, bottom and sidewalls defining a vapor chamber 405, column 5 line 3, said vapor chamber 405 containing a heat transfer fluid, column 5 line 7, said lid 404 having a second CTE expansion said second CTE about equal to said first CTE; providing a peripheral lid supports 409, column 4 line 55, said peripheral lid support separate from said lid, said lid support 409 having sidewalls defining a cavity open at top and bottom surface of said lid support, fig. 4; attaching said top surface 424 said peripheral lid support 409 to a bottom surface 426 of said sidewalls 445 of said lid and attaching said bottom surface of said peripheral lid support 409 to a periphery of said substrate 402,

said bottom wall 426 of said lid 404 not attaching to said peripheral lid support, fig. 4; providing a solid thermal transfer medium 431, column 4 line 66 in direct contact with a back surface of each component 420/422, fig. 4, and an outer surface of said bottom wall 426 of said lid 404; mounting each component 420 directly to a top surface of said substrate 402; and electrically connecting each component to said substrate, column 4 lines 42-46.

With respect 'peripheral lid support separate from lid', Xie discloses in fig.

2. a support 218 can be an integral part of the bottom 204 or a separated structure that is attached to the bottom 204, column 4 lines 1-5.

Regarding claim 11, Xie discloses the method of claim 10, wherein said upper wall and sidewalls of said lid have second CTE, said bottom wall of said lid is separate from said upper wall, fig. 2 (upper and lower is attached by 206) and side walls of said lid, said bottom wall of said lid has a third CTE each said component has a fourth TCE, said third CTE is about equal to said fourth CTE and said second CTE different from said third CTE (the material properties of lid and component).

Regarding claim 12, Xie discloses the method of claim 10, further including: mounting a heat sink 140, fig. 1C column 3 line 35, having a third CTE to an outer surface of said top wall of lid 104, fig. 1C.

Regarding claims 13 and 28, Xie discloses the method of claim 10, wherein said lower wall 426 of said lid 404 has protruding first regions (where 431 is located) for maintaining equivalent contact with said thermal transfer medium 431 on thin components 422 of said one or more components as is maintained by second non-

Art Unit: 2814

protruding regions (where 430 is located) on thick components of said one or more components, said first regions thicker than said second regions, fig. 4.

Regarding claim 15, Xie discloses the method of claim 10, wherein said package is selected from the group consisting of ball grid array modules, pin grid array modules, land grid array modules and HyterBGA modules, see filed of invention, such substrate package is generally known as PGA or flip chip, column 2 lines 40-41.

Regarding claim 16, Xie discloses the method of claim 10, wherein said lid 404 (104) is formed from material selected from the group consisting of aluminum, copper, Invar, gold, silver, nickel, aluminum-silicon carbide, plastics, ceramics and composites, column 4 lines 47-51.

Regarding claims 22, 36, Xie discloses the method wherein an upper wall 424 of said lid 404 has second CTE, the lower wall 426 of said lid 404 has a third CTE, wherein the lid is fabricated from the same material as said sidewalls 445 of said lid, column 3 line 49.

Regarding claims 33-35, Xie discloses the third CTE is between about 25% and about 700% of second CTE, each components has a fourth CTE and the third CTE is between about 50% to about 700% of fourth CTE, and first CTE is between 25% to about 700% of second CTE.

The lid and the heat sink comprise metal materials such as copper or aluminum; thus the third CTE and the second CTE would be the same or 100%.

The IC comprises silicon while the heat sink comprises copper or aluminum. Silicon has the CTE about  $36 \times 10^{-7}/\text{C}^{\circ}$ , while copper has CTE about  $17 \times 10^{-6}/\text{C}^{\circ}$ . Thus, the different would be within the range as claimed.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 14 and 38-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5880524 Xie in view of US 5198889 to Hisano et al.

Regarding claims 14, 38-42, Xie does not disclose the method further including providing supports within chamber, each support having a vertical member extending between the top wall of lid and the bottom wall of the lid, each vertical member

perpendicular to the top and the bottom walls and each vertical member aligned over one or more of the component, wherein the support are vertical bars and do not extend beyond peripheries of one or more component, wherein said sidewalls of said lid comprise bellows, and the method further including providing supports within said vapor chamber, said supports comprising bellows, each bellows aligned over a corresponding component of said one or more components.

However, Hisano disclose the method in fig. 12 comprises a supports 23, col. 10 line 36, within chamber, each support 23 having a vertical member extending between the top wall 25 of lid and the bottom wall 27 of the lid, col. 10 line 41 and 47, each vertical member 23 perpendicular to the top and the bottom walls and each vertical member aligned over one or more of the component 1, col. 10 line 37, wherein the support are vertical bars and do not extend beyond peripheries of one or more component, fig. 12, wherein said sidewalls of said lid comprise bellows, fig. 29, and the method further including providing supports within said vapor chamber, said supports comprising bellows, each bellows aligned over a corresponding component of said one or more components, fig. 29. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the support structure teaching of Hisano with Xie's lid, because it would have provided a cooling apparatus for cooling the semiconductor device as taught by Hisano in col. 1 lines 5-8.

6. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5880524 Xie in view of US 5097387 to Griffith

Regarding claim 17, Xie discloses the packaging substrate 402

But Xie does not disclose the substrate includes material selected from the group consisting of ceramics, firer glass, polytetraflouroethylene, and polymer.

However, Griffith discloses the substrate 12 includes material selected from the group consisting of ceramics or polymer, column 3 lines 15-16. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the teaching of Griffith with Xie's method, because such printed circuit board for packing is typical in the art as taught by Griffith, column 3 lines 13-17.

7. Claim 21 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5880524 Xie in view US 6637506 to Gektin et al.

Regarding claims 21 and 37, Xie does not disclose the lower wall 426 of the lid is formed from different material than the sidewalls 445 and an upper wall 424 of the lid.

However, Gektin discloses the method for dissipating heat wherein the lower wall (center portion) of the lid is formed from different material than the sidewalls and an upper of the lid (perimeter portion), column 3 lines 10-15 and column 4 lines 34-39. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the lid teaching of Gektin with Xie's method, because the selection of different material would have provided a thermal conductivity or to create or structure having different CTE values for suitable intended used, MPEP 2144.07,



8. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 5880524 Xie in view of US 4547424 to Suzuki or US 6329603 to Japp et al.

Regarding claim 43, Xie does not disclose the method wherein the substrata comprises polytetrafluoroethylene (PTFE)

However, Suzuki discloses a substrate material for comprises PTFE. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the substrate teaching of Suzuki with Xie's method, because it would have provided a substrate having high compression resistance as taught by Suzuki, see abstract, or the PTFE would have lower CTE preventing cracking or de-bonding as taught by Japp, col. 6 lines 25-40 and 65.

### ***Response to Arguments***

9. Applicant's arguments filed on 20 Sept 2005 have been considered but are moot in view of the new ground(s) of rejection.

The Applicant also argues that Xie does not disclose a peripheral support, said peripheral lid support separate from the lid'. This is not persuasive because as discussed in claim 1, Xie discloses in fig. 2. a support 218 can be a integral part of the bottom 204 or a separated structure that is attached to the bottom 204, column 4 lines 1-5.

***Conclusion***

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2814

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thao X. Le  
Patent Examiner  
13 Oct. 2005



LONG PHAM  
PRIMARY EXAMINER